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Saturated Fluctuations and Transport in Axial, Azimuthal Hybrid Hall Thruster Simulations[1] CALEB DOWDY, JACOB ALEY, EDUARDO FERNANDEZ, Eckerd College — Simulation studies of Hall thrusters aimed at describing the global domain typically employ hybrid schemes instead of more expensive kinetic approaches. Such simulations are generally in the radial and axial coordinates, assuming axisymmetry in order to circumvent azimuthal dynamics. Cross-field electron transport is enhanced (in an ad-hoc manner) in order to sustain the plasma and produce simulation profiles in semi-quantitative agreement with experimental measurements. In this work we present results from an axial/azimuthal hybrid fluid-PIC model of Hall thrusters that treats the azimuthal dynamics self-consistently, without employing ad-hoc transport parameters. Unlike previous simulation efforts with this model, the current work has succeeded at obtaining fully saturated states at high voltage, resolving the longest (breathing mode) timescales in the system. Equilibrium profiles and fluctuations predicted by the simulation will be presented. The latter are analyzed in terms of their frequency and propagation characteristics, as well as their contribution to transport. Linear stability theory is used to comment on the possible origin of the disturbances. Finally, the role of EXB flow shear on the potential regulation of fluctuation-induced electron transport is discussed.

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None

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